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Annual Report

Alberta environmental research trust

CREATED BY LEGISLATIVE ENACTMENT APRIL 16, 1971

For the Year 1973

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ANNUAL REPORT FOR THE YEAR 1973

CONTENTS

Board of Trustees 1
Grants Advisory Committee
Research Secretariat Staff

Introduction 2

Trust Activities 3

Operation of the Trust 4

Evaluation of Research Proposals 5

Projects Funded 6

Financial Statement 7

Alberta Environmental Research Trust Act . . 8

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BOARD OF TRUSTEES

Dr. E. E. Ballantyne, Chairman
Deputy Minister
Alberta Department of the Environment

Dr. E. E. Daniel
The University of Alberta

Mr. Gordon Conway

Mrs. Betty Mitchell

Mrs. Elly de Jongh

Mr. W. R. Newfeld

Dr. R. A. Ritter
The University of Calgary

Mr. Robert Scammel

GRANTS ADVISORY COMMITTEE

Dr. T. W. Manning, Chairman
The University of Alberta

Dr. David Boag
The University of Alberta

Mr. D. V. Currie
Mobile Augers & Research Ltd.

Dr. Stephen Herrero
The University of Calgary

Dr. Richard Rowe
The University of Calgary

Dr. P. J. Smith
The University of Alberta

RESEARCH SECRETARIAT STAFF

Dr. S. B. Smith, Chairman of the
Research Secretariat and Secretary
to the Alberta Environmental
Research Trust

Dr. W. MacDonald
Scientific Advisor

Mr. Allan Welsh
Administrator

INTRODUCTION

Security against the inconsistencies of nature appears to have remained a constant goal throughout the history of human development.

In accomplishing this end, humans have fought for thousands of years to free themselves from environmental restraints restricting their daily lives.

Many people are now asking whether some of the penalties we are paying as a result of environmental degradation caused by the human fight are too high.

Certainly there is acceptance of the need for research to provide an 'Environmental Census' not only in biophysical terms, but in terms of human values and perceptions.

The Alberta Environmental Research Trust was created for just that purpose--to provide a funding mechanism for research leading to improvement in environmental quality.

A yearly grant of $200,000 is provided by the Government of Alberta and contributions are accepted from other sources.

Created as a provincial corporation by enactment of the Legislative Assembly of Alberta, the AERT's fundamental concept is to provide a mechanism for "the expansion of applied and fundamental research relative to environmental improvement."

To serve this end, the Trust is enjoined to "seek and receive" the necessary funds allowing the organization to support environmental research.

Where feasible, the Trust will apportion grants of its funds for research in each year equally between persons or institutions that are supported entirely or mainly by public monies and those that are not.

Provision has been made for the operation of the Trust in a manner consistent with corporate operation and according to legislation specifically concerning Trust Funds in Alberta.

Trustees make their own by-laws which become effective when passed by a majority and signed by the Minister of the Environment.

TRUST ACTIVITIES

From its inception as an Alberta corporation on April 16, 1971, the Alberta Environment Research Trust initially looked to the Environment Conservation Authority and its Public Advisory Committee on the Environment for an indication of environmental research priorities.

When the first meeting of the Board of Trustees was held in May, 1972, a draft set of by-laws was approved in principle and the necessity for a Grants Advisory Committee was recommended.

The Chairman and seven trustees continued to work from May, 1972, until January, 1973, to develop an apparatus for management of funds and a Grants Advisory Committee to advise on research grant applications.

By the end of 1972 the Trust had established its own internal working arrangements and carried its review of research priorities to a point where it was prepared to approve the disbursement of funds to applicants.

Advice from within and outside the Government aided the Trust in establishing operational and granting policy and present environmental research priorities.

OPERATION OF THE TRUST

To obtain an analysis and assessment of research applications, the AERT appointed a Grants Advisory Committee to assume this responsibility. This committee is made up of scientists familiar with the various environmental disciplines.

The final decision concerning funding of projects, however, rests with the Board of Trustees, consisting of the Deputy Minister of the Environment and seven people representative of the general public.

The Chairman of the Research Secretariat of the Alberta Department of the Environment is named Secretary to the Board. The Trust has not yet appointed employees and the Secretariat supplies office space, administrative and secretarial support, fiscal support for the normal operation of the Trust and scientific evaluation of research grant applications.

Government funds are transferred each year from the appropriation of the Alberta Department of the Environment and placed to the credit of the Trust under control of the Provincial Treasurer. The money is invested and accrued interest credited to the Trust.

Applications to the Trust, which must be received by October 1 of each year, are reviewed by the Grants Advisory Committee, and the Research Secretariat staff, with the final decision coming from Trustees.

The Grants Advisory Committee reviewed more than 100 applications in 1973 alone. Without the committee's help, an adequate review of submissions would not have been possible.

After indicating future operating requirements, a new budget has been provided and the Board is proceeding to acquire an administrative secretary to administer the affairs of the Trust. Other services will still be provided by the Research Secretariat.

The request for support from Trust funds appears likely to continue to exceed the available funds by a large margin in the future.

The Trust acknowledges the support and continued funding of the Government of Alberta, the Alberta Department of the Environment and in 1973 the financial bequest received from Alberta Gas Trunk Line Limited.

EVALUATION OF RESEARCH PROPOSALS

To improve the quality of life for Albertans, Trustees must define the kinds of projects which will be most beneficial to environmental improvement. A certain degree of relevance is then assured to the research results.

In order to guide applicants in preparing applications, Trustees have set up certain priorities for research support. These include that problems being investigated be urgent, or of long-term importance to Alberta, or both. Furthermore, within the various categories of environmental research, they have made a classification, and suggested that in certain areas research up to now has been deficient. These will be set forth in a brochure to be made available for applicants and interested members of the public.

With the emphasis being placed on physical environmental problems a need has also been created to examine other areas of concern which have not received sufficient attention.

More research into the problems confronting man and his environment is required. Little attention has been paid to evaluating decisions made by Albertans. Often developments proceed without a proper evaluation of the benefits and cost involved or of the impact of such developments on the future of the province.

Because Alberta has such a great expanse of territory free from urban development, Trustees must decide how it can be protected and yet utilized more effectively.

Man's congregation into urban centres and low density living in rural communities has created different pollution problems in each setting. Many are now being examined but considerable novel research is necessary if solutions are to be found.

Research projects submitted to the Trust must be evaluated on an individual basis. Several criteria have been established which pose questions relating to the basis of the research and its impact of man on the environment; the importance of the problem; scientific and technical validity; competency of the applicant; and the benefits in respect to costs.

There are exceptions made, however, when Trustees consider it necessary. Budgetary constraints also preclude the funding of all proposals which meet the criteria. In some cases the Trustees will request that funds be sought from another source.

In summary, the Board of Trustees is involved with continuing development of a set of priorities which can be used to provide a general direction for environmental research. Such priorities will be made known to applicants to assist in formulation of proposals, donors to the Trust, and to the public at large, on whose behalf environmental research is sponsored.

PROJECTS FUNDED BETWEEN DECEMBER 31, 1972 AND JANUARY 31, 1974

During this period the Board reviewed 101 applications and funded 25 environmental research projects, summarized as follows:

A STUDY OF THE ENVIRONMENTAL ASPECTS OF OIL SPILLS ON LAND IN ALBERTA

APPLICANTS: Dr. M. F. Mohtadi and Dr. J. M. Raisbeck, University of Calgary

DURATION: three years

OBJECTIVE: to research the interactions of important physical, chemical and microbiological processes associated with oil spills on land. Theoretical models will be developed for vertical infiltration prediction and lateral spreading of oil in porous media. Experimental apparatus will be constructed to study oil spills on soils of different temperatures and a study dispersion of water-soluble oil components. An instantaneous oil leak simulator and time lapse photography will be used.

OCCURRENCE OF HEAVY METALS IN SELECTED CROPS AND SOILS IN ALBERTA

APPLICANTS: Dr. S. Pawluk and Dr. M. J. Dudas, University of Alberta

DURATION: three years

OBJECTIVE: to provide data on heavy metals including mercury, cadium, zinc, lead, copper and manganese, in crops and soils, for use by investigators involved with human physiology and veterinary science. Ash concentrations will be determined by a spectrometer from samples throughout Alberta.

FATE OF EMITTED SULPHUR DIOXIDE IN ALBERTA

APPLICANTS: Dr. C. F. Bentley and Dr. M. Nyborg, University of Alberta

DURATION: three years

OBJECTIVES: to determine amounts of SO_2 absorbed directly by vegetation, soils and waters and precipitation by rain and snow at various distances from SO_2 emission sources; rates at which SO_2 acidifies soil, rainfall and surface waters at various distances from emission sources; to obtain data to calculate the fate of SO_2 and longterm effects of acidification on soils, surface waters and vegetation.

POLLUTANT DISPERSION AND ITS MATHEMATICAL MODELLING

APPLICANTS: Dr. K. Aziz and Dr. J. K. Donnelly, University of Calgary

DURATION: three years

OBJECTIVES: Investigation of single-stack emissions of air pollutants indicated that dispersion could not be modelled for distances less than 1,000 meters. Simulation of dispersion of transient pollutants show that time dependent processes can be modelled. Studies of mathematical models supported by this fact are aimed at "Air Shed Model" prediction which may be applicable to the entire province. Multiple stack emissions, irregular terrain and time-varying environments will be studied.

A STUDY OF EPIPHYTIC LICHENS IN THE VICINITY OF A GAS PROCESSING PLANT

APPLICANT: Mr. James W. Case, University of Calgary

DURATION: one year

OBJECTIVE: to determine the effect of air pollution (SO_2) on lichens near sour gas plants and an index of air quality by use of a map based on the distribution and number of species. Frequency, diversity and coverage of species on trees for various distances will be determined. Dominant species will be studied in detail. The project will provide a start for use of biological indicators of air pollution, applicable anywhere in the province where lichens occur.

SELECTION AND SURVEY OF POTENTIAL ECOLOGICAL RESERVES

APPLICANT: Dr. W. A. Fuller, University of Alberta

DURATION: one year

OBJECTIVES: to provide data for the identification of candidate areas representing the diversity of natural ecosystems and habitat types and recommendations for formal conservation status for outstanding areas, to provide a data base of guidelines for use and management of ecological reserves; to identify ecological reserves which can be used as outdoor laboratories and benchmark sites where genetic and species diversity in ecosystems can be preserved. Such reserves can provide data for use in assessing man's impact on the natural environment. Project is a continuation of the International Biological Program.

RIVER VALLEY ENVIRONMENT IN THE CITY OF EDMONTON

APPLICANT: Edmonton Social Planning Council

DURATION: six months

OBJECTIVE: to analyze problems relevant to management of specific elements of the physical environment in Edmonton, viz., river valley trails and "mini parks". A task force approach involving citizen groups, individuals and representatives of government will be used. Research results will be oriented to evaluation and formulation of policy.

USE OF FIELD TECHNIQUES IN HIGH SCHOOL ENVIRONMENTAL STUDIES

APPLICANT: Dr. Lois R. Fenna

DURATION: one month

OBJECTIVE: research in environmental education to investigate the feasibility of outdoor field work in high school biology. Project will assess the most effective field work in relation to conventional classroom techniques. Biology teachers will assist in devising field work schemes and will provide a control group without field exposure. Results will be analyzed with a final report prepared with the co-operation of teachers and staff.

TOTAL SYSTEMS APPROACH TO DESIGN OF RECLAMATION AND RECYCLING SYSTEMS FOR SOLID WASTES

APPLICANT: Dr. J. C. Sprague, University of Alberta

DURATION: three years

OBJECTIVES: to develop a total system of solid waste disposal; to determine quantities of various solid wastes in relation to the economic justification for recovery recycling; to determine optimum collection and separation parameters; economic feasibility and need for subsidization, if any. A review of existing legislation on disposal of solid wastes will be included. Trust funding is initially provided for the first year. A review by the applicant will follow.

CARCINOGENIC HYDROCARBONS AS POLLUTANTS IN THE ATMOSPHERE OF CALGARY

APPLICANTS: Dr. G. A. Hodgson and Dr. E. Peake, University of Calgary

DURATION: fifteen months

OBJECTIVE: A relationship may exist between the incidence of lung cancer and areas of high levels of pollution such as industrial and downtown areas of major cities. Project will identify carcinogens in Calgary's atmosphere. Specifically designed to detect and measure levels of 15 known carcinogenic polycyclic aromatic hydrocarbons (PAH) and 60 other hydrocarbons in the atmosphere, the study will determine human exposure levels and identify sources of atmosphere hydrocarbons.

COLLECTION AND DISPOSAL OF WASTE OILS IN ALBERTA

APPLICANT: Synergy West Limited

DURATION: six months

OBJECTIVES: Applicant proposes funding be jointly supplied by the Trust and Turbo Resources Ltd., of Edmonton. Turbo agrees to joint funding. Objectives of research are to provide: a comprehensive review of collection, transportation and segregation of waste lubricating oil before refining; a primary cost analysis of a total recycling system; a review of possible alternatives for logistics and financing of an effective collection system.

CLARIFICATION OF WASTE WATER FROM TAR SANDS PROCESSING

APPLICANT: Wilson Mud Service Limited

DURATION: seven months

OBJECTIVES: to evaluate a range of coagulants and flocculants as waste water clarifiers; to determine an efficient system for clarification of waste water for plant recycling and discharge to surface receiving waters and the economics of the systems tested.

A STUDY OF THE ROLE OF WOMEN IN ENVIRONMENTAL CONSERVATION

APPLICANTS: Sheila Abercrombie and Anne Stewart

DURATION: eight months

OBJECTIVES: to examine actual and potential roles of Alberta women in development of environmental awareness, attitudes and habits related to environmental conservation; to survey literature of women's performance, with emphasis on research conducted in Alberta; to identify and rate sources of environmental information. Research is two-fold--an informal, preliminary survey and a more formal final survey.

PREPARATION OF CONSOLIDATED PEAT MOSS BLOCKS AND SLABS

APPLICANT: Alberta Research Council

DURATION: twelve months

OBJECTIVE: to research the development of shaped peat blocks for use in absorbing oil spills, particularly on water. Peat has a high coefficient of absorption but cannot be effectively used in loose form. Research will be concerned with selection, testing and modification by additives of Canadian peats; to rank their oil-absorbent properties; to render them more hydrophobic by addition of waxes and thermal treatment to test shaping properties; to test permeability, floatability, oil and water absorption properties, and mechanical strength during recovery.

MICROBIAL AND BIOCHEMICAL STUDIES OF THE EDMONTON INDUSTRIAL LAGOONS

APPLICANT: City of Edmonton

DURATION: twelve months

OBJECTIVES: to analyze liquid samples from lagoons for micro-organisms involved in the digestion process in anaerobic and facultative lagoon systems; to isolate and identify areas of critical nutrient requirements in the lagoon system; to determine essential micro-organisms required for decomposing fatty acid materials and the techniques for promoting optimum physiological conditions for the essential micro-organisms in the system.

OCCUPATIONAL AND COMMUNITY EXPOSURE TO CARBON MONOXIDE IN CALGARY, ALBERTA

APPLICANT: Dr. C. A. Guenter, M.D., F.R.C.P.(C), University of Calgary

DURATION: twelve months

OBJECTIVES: to determine levels of carbon monoxide in several areas of Calgary; exposure to CO of parkade employees, central business district workers in heavy traffic and a group of U of C staff exposed to low concentrations; changes in rate and range of carboxyhemoglobin blood levels in relation to fluctuations in CO levels; to assess blood hemoglobin values in individuals chronically exposed to CO; and the effects of environmental CO on carboxyhemoglobin levels in individuals of different age, smoking habits and length of time to occupational exposure.

SPATIEL AND ECONOMIC IMPACT OF RECREATIONAL EXPENDITURES AND SALES IN THE PIGEON LAKE AREA OF ALBERTA

APPLICANT: Dr. R. G. Ironside, University of Alberta

DURATION: one year

OBJECTIVE: to evaluate the impact of recreational development on an environment otherwise characterized as rural, both socially and economically. Visitor expenditure will be evaluated and traced; multiplier effects calculated; magnitude and location will be determined for economic facilities acting as linkages between recreational expenditure and local economy.

A STUDY OF ODOUR CONTROL IN PIG WASTES

APPLICANT: Dr. J. B. McQuitty, University of Alberta

DURATION: two years

OBJECTIVE: to investigate microbial and biochemical characteristics of pig wastes with special attention to production of malodorous sulphur compounds. Microbial agents involved in asaerobic decomposition will be identified and an attempt will be made to determine means of inhibiting malodorous compounds. Research will be aimed at livestock operations adjacent to urban areas.

A STUDY OF THE ENVIRONMENT OF THE WHITECOURT AREA OF ALBERTA WITH PARTICULAR REGARD TO THE EFFECTS OF SULPHUR COMPOUNDS

APPLICANT: Whitecourt Environmental Study Group

DURATION: four years

OBJECTIVES: to study the effects of SO_2 emissions from 12 gas processing plants over a 5000 square mile area; to identify the role of SO_2 in vegetation stress preconditioning; to study effects of sulphur compounds on biological systems; and to trace sulphur compounds through physical systems (air, soil, water) to determine by remote sensing and ground level measurements plume dispersion of SO_2 in relation to local and regional meteorology.

ACTIVITY AND MOVEMENT PATTERNS OF NATIVE FISH

APPLICANT: Dr. W. C. Mackay, University of Alberta

DURATION: twelve months

OBJECTIVE: to identify and document movement and activity patterns of northern pike in Lac Ste. Anne, Alberta. Fish will be caught by angling and nets and ultrasonic transmitters will be attached to fish and tracked by a directional hydrophone. Responses of fish to environmental cues (food, availability, temperature, introduced pollutants) will be studied. Results will be related to management of northern pike (and other species) in Alberta.

ANNUAL CHANGES IN THE NUTRIENT AND ENERGY CONTENT OF NATIVE FISH

APPLICANT: Dr. W. C. Mackay, University of Alberta

DURATION: twelve months

OBJECTIVE: to evaluate the extent of annual changes in protein, fat and energy content of native Alberta fish in normal and thermally altered environments and the time during the cycle when fish are subject to the greatest stress with regard to energy reserves. Results will be related to annual mortality in northern pike and whitefish in Lac Ste. Anne and Lake Wabamun. Both have natural and thermally altered temperature regimes.

ECOLOGICAL AESTHETICS: THE VISUAL ELEMENT IN NATURAL PARK EVALUATION

APPLICANT: Dr. W. A. Fuller, University of Alberta

DURATION: two years

OBJECTIVE: to qualify the human reaction to natural lands and analyze the content of those landscapes arousing a positive response. A series of landscapes of the Rocky Mountain region will be photographed and evaluated by a geological, ecological and human interest scale. Questionnaires to national parks visitors, campground interviews and laboratory responses of human subjects (papillary response techniques) will evaluate effects of visual attributes of natural landscapes.

A STUDY TO DEVELOP AND EVALUATE DAMAGE ASSESSMENT AND RECLAMATION TECHNIQUES FOR SOILS RECEIVING CRUDE OIL SPILLS

APPLICANT: Dr. J. A. Toogood, Co-ordinator, University of Alberta

DURATION: three years

OBJECTIVES: to develop and evaluate techniques to assess the amount and longevity of damage to soil/plant systems; to relate the damage of soil to climatic zone, oil type, soil conditions at time of spill, and chemical, physical and biological properties of soil; to develop and evaluate reclamation procedures best suited to specific soil conditions and types of crude oil; and compile results in a field handbook for those involved in oil spill soil reclamation.

SYCLIT: SOLID WASTE MANAGEMENTS

APPLICANT: M. B. M. Research Limited, Calgary, Alberta

DURATION: twelve months

OBJECTIVES: to utilize cellulose based waste materials to produce charcoal briquettes; laboratory research to perfect a suitable product; design a production plant for briquettes based on tests; determine consumer acceptance of products made from waste materials and conduct market research into consumer behavior.

ANHYDROUS RECOVERY OF BITUMEN IN A FLUIDIZED BED REACTOR

APPLICANT: Dr. D. W. Bennion, University of Calgary

DURATION: three years

OBJECTIVE: to investigate the feasibility of bitumen recovery from oil sands by direct coking in a fluidized bed reactor, instead of present "hot water process". Thermal economics of anhydrous bitumen recovery will be evaluated and anhydrous method will be compared with present technology.

LEGISLATIVE ASSEMBLY

ALBERTA

OFFICE OF THE PROVINCIAL AUDITOR

AUDITOR'S REPORT

To the Board of Trustees of the
Alberta Environmental Research Trust

I have examined the balance sheet of the Alberta Environmental Research Trust as at December 31, 1973 and the statement of revenue and expenditure for the year then ended. My examination included a general review of the accounting procedures and such tests of accounting records and other supporting evidence as I considered necessary in the circumstances.

In my opinion these financial statements present fairly the financial position of the Trust as at December 31, 1973 and the results of its operations for the year then ended, in accordance with generally accepted accounting principles.

D. J. Roy C.A.
Provincial Auditor.

Edmonton, Alberta
May 24, 1974

ALBERTA ENVIRONMENTAL RESEARCH TRUST

NOTE TO THE FINANCIAL STATEMENTS

DECEMBER 31, 1973

Note 1 Authority

The Alberta Environmental Research Trust operates under the authority of The Alberta Environmental Research Trust Act, Chapter 31, Statutes of Alberta 1971.

GOVERNMENT OF THE PROVINCE OF ALBERTA

THE ALBERTA ENVIRONMENTAL RESEARCH TRUST ACT

OFFICE CONSOLIDATION

CHAPTER 31

THE ALBERTA ENVIRONMENTAL RESEARCH TRUST ACT

(Assented to April 16, 1971)

(Amended June 2, 1972)

HER MAJESTY, by and with the advice and consent of the Legislative Assembly of Alberta, enacts as follows:

Definitions

1. In this Act,

(a) "Deputy Minister" means the Deputy Minister of the Environment;

(b) "property" means real and personal property, including contractual benefits, patent rights, money, rights in futuro and choses in action generally;

(c) "Trust" means the Alberta Environmental Research Trust incorporated by this Act.

Incorporation

2. There is hereby established a corporation with the name of the Alberta Environmental Research Trust consisting of the trustees appointed by or pursuant to section 6.

Objects

3. The objects of the Trust are

(a) to seek and receive property by gift, bequest, devise, transfer or otherwise, and

(b) subject to any prior trust conditions imposed upon the use of the property, or the income thereof, or any of it, to hold, use and administer it for the purpose of provincial expansion of applied and fundamental research relative to environmental improvement.

Duties and powers

4. The Trust

(a) shall apply its property or expend the income therefrom for such particular purposes, including trust conditions imposed, that might not otherwise be readily met out of public funds;

(b) shall invest its funds in securities authorized by law for investment of trust funds or as may be directed by the donor;

(c) may enter into contracts and do all other things which may be necessary, desirable or expedient to effect its objects;

(d) shall endeavour, to the extent that it considers it reasonably feasible to do so, to apportion grants of its funds for research in each year equally between persons or bodies that are supported entirely or mainly by public moneys and those that are not.

Board of Trustees

5. (1) There shall be a board of trustees for the Trust consisting of the Deputy Minister and seven other persons appointed by the Lieutenant Governor in Council and representatives of the general public.

(1.1) The term of office of a trustee appointed by the Lieutenant Governor in Council shall be three years from the date of his appointment unless otherwise specified by the order making the appointment.

(2) The Deputy Minister shall be the chairman of the board of trustees and the Director of the Research Division of the Department of the Environment shall be its secretary.

(3) A majority of the trustees constitute a quorum.

(4) The trustees shall meet at least once a year on a date to be fixed by the chairman.

By-laws

6. (1) The trustees may make by-laws respecting

(a) the appointment, functions, duties and removal of all agents, officers and employees of the Trust and their remuneration,

(b) the time and place for the meetings of the trustees and the procedure to be followed at such meetings, and,

(c) the general conduct of the business and affairs of the Trust.

(2) A by-law does not become effective

(a) unless it is passed by a majority of the trustees holding office, and

(b) until it is approved by the Minister of the Environment.

(3) A by-law signed by a majority of the trustees holding office is as valid and effective as if passed at a meeting of the trustees.

Committees

7. (1) The trustees may at any time delegate any of their powers to committees consisting of such of the trustees and of such other persons as the trustees consider advisable.

(2) Any committee so formed shall, in the exercise of the powers so delegated, conform and be subject to the directions, restrictions and by-laws, if any, that are imposed upon it by the trustees.

Coming into force

8. This Act comes into force on a date to be fixed by proclamation.

NOTE: Section 5 (2)

Reference to the "Director of the Research Division" should be taken to read "Chairman of the Research Secretariat".

AUG 8 '76